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INTELLECTUAL PROPERTY LAW

BY FACSIMILE
CONFIRMATION BY COURIER

FAX: 011 49 89 2399-4465

August 20, 2004

Attention: J. Klaver
International Preliminary Examining Authority
European Patent Office
D-80298 Munich
Germany

Re: PCT Application No. PCT/CA03/01229
Lorus Therapeutics Inc. *et al.*
Our File: 335-148PCT

Dear Sir/ Madam:

RESPONSE TO WRITTEN OPINION

This communication is in response to a first Written Opinion mailed May 24, 2004, and a second Written Opinion mailed June 21, 2004.

Please replace claims 1 to 25, presently on file, with new claims 1 to 27, submitted herewith on new pages 73-88. A first set of new claims is enclosed that reflects the changes with added wording being indicated by the use of underlining and deleted wording being indicated by the use of strikethrough. The Applicants have also enclosed a second set of the amended claims in final format.

Please also note that the Applicants had submitted new claims 1 to 25, replacing claims 1 to 20 as originally filed, under Article 19 of the Patent Cooperation Treaty on April 26, 2004. The amended claims have been accepted and published by the International Bureau of WIPO. The Examiner has not, however, considered new claims 1 to 25 (as confirmed in a second, or

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apparently supplemental Written Opinion mailed June 21, 2004). Instead the Examiner has confirmed that claims 1 to 20 as originally filed have been examined. The Applicants have, therefore, addressed the Examiner's objections to the original claims and have made reference, where appropriate, to the amendments made in the claims filed under Article 19 of the PCT and any further amendments thereto, submitted herewith under Article 34 of the PCT.

The Applicants have provided the following Table of Concordance in order to assist the Examiner in tracking the amendments made to the claims as originally filed. The Table of Concordance is provided to also indicate how the claims filed under Article 19 of the PCT and the claims with the further amendments submitted herewith essentially correspond, in whole or in part, to the claims as originally filed.

Claims as originally filed	Claims filed under Article 19 of the PCT	New claims filed herein under Article 34 of the PCT
1	1, 2	1, 2
2	3	3
3	4	4
4	5,6	5,6
		7 (new)
5	7	8
6	8	9
7	9	10
8	10	11
9	11	12
10	12, 13	13, 14
11	14	15
12	15, 16	16, 17
13	17	18

14	18	19
15	19	20
16	20, 21	21, 22
17	22	23
18	23	24
19	24	25
20	25	26
		27 (new)

Re Item V

Under Subsection 1

The Examiner has objected to originally filed claims 4, 6, 8, 10 and 17 under Article 54(3) EPC in light of Document D3 (WO 03/004023). The Examiner states that in light of the publication date of January 16, 2003 for D3 and the priority date of August 19, 2002, as claimed by the present application, D3 does not form part of the prior art under Rule 64.1(b)(ii) PCT. The Examiner further states that for the European phase application of the instant PCT application, D3 would be relevant prior art under Art. 54 (3) EPC. The Applicants thank the Examiner for his comments and will address such an objection as may or may be not necessary subsequent to a filing the European National Phase application.

Under Subsection 2

The Examiner has objected to originally filed claims 1-8, 10-14 and 16-18 under Article 33(2) PCT, alleging that the subject matter of these claims is not novel in view of documents D1, D2, D4-D8 and D10.

Specifically, the Examiner states that document D1 (WO 00/78761) discloses "2-(3-indolyl)-benzimidazoles" and their use as "anti-microbial or anti-infective agents", in particular against

antibiotic-resistant bacteria, that fall within the scope of originally filed claims 1-6, 8, 10-14, 16 and 17. In light of the amendments to originally filed claims 1, 4, 10, 12, 16 and 17 made under Article 19 of the PCT and the further amendments made to the claims attached herein (under Article 34 of the PCT), the Applicants believe that the subject matter of new claims 1, 2, 5, 6, 13, 14, 16, 17, 21, 22 and 23 (essentially corresponding to originally filed claims 1, 4, 10, 12, 16 and 17) and claims dependent thereon, is novel over the disclosure of the D1 and, therefore, respectfully requests that this objection be withdrawn.

The Examiner further alleges that originally filed claims 4-6, 8, 10, 11, 16 and 18 of the instant application lack novelty in light of the disclosure of document D2 (EP 77024 A2). The Examiner states that D2 discloses "2-heteroaryl-4,5-diphenyl-imidazoles" and their use as anti-inflammatory agents, including against inflammations associated with bacterial infections (such as *Mycobacterium* infections). The Examiner further states that D2 discloses pharmaceutical preparations comprising such compounds and an exemplified compound "[4,5-bis-(4-methoxyphenyl)-2(3-indolyl)-imidazole]" that falls within the scope of originally filed claim 18. In light of the amendments to claim 18 made under Article 19 of the PCT and the further amendments made resulting in new claim 24, attached herein, the Applicants believe that the subject matter of new claim 24 is not anticipated by D2, and, therefore, respectfully request that this objection be withdrawn.

With respect to originally filed claims 4-6, 8, 10, 11 and 16 (now claims 5, 6, 8, 9, 11, 13, 14, 15, 21 and 22), the Applicants respectfully traverse the Examiner's objection. D2 discloses a class of imidazole derivatives and their use as anti-inflammatory and anti-allergenic agents. The pharmaceutical compositions disclosed by D2, therefore, are not *anti-microbial* compositions, as claimed in originally filed claims 10, 11 and 16, but anti-inflammatory or anti-allergenic compositions. Furthermore, page 3, paragraphs 3-7 of D2, as referred to by the Examiner to support the allegation that D2 anticipates originally filed claims 4-6, 8, 10, 11 and 16, describes the testing of the described imidazole derivatives for their ability to inhibit inflammation using a standard anti-inflammatory model: adjuvant mediated arthritis. The adjuvant employed in the test

described in D2 is *Mycobacterium butyricum*. As is well known in the art, when used as an adjuvant in this standard protocol, the *M. butyricum* bacteria are heat-killed, *i.e* are incapable of establishing an infection. The Applicants assert that D2, therefore, does not disclose the use of any of the described imidazole derivatives in the treatment or prevention of a microbial infection or a disease/disorder associated with such an infection, as claimed in originally filed claims 4-6 and 8, nor does D2 disclose any anti-microbial compositions. The Applicants submit that originally filed claims 4-6, 8, 10, 11 and 16 (essentially corresponding to new claims 6, 8, 9, 11, 13, 15, 21 and 22) are novel over D2 and respectfully request that this objection be withdrawn.

The Examiner further states that the document D4 (WO 02/46168 A1) discloses "2-(aryl/heteroaryl)-benzimidazoles," including a "2-(3-indolyl)-substituted derivative," their use as "estrogen receptor ligands" and the preparation of pharmaceutical formulations comprising such compounds and that this document anticipates the novelty of originally filed claims 10, 16 and 17. The Applicants believe that in light of the amendments made to claim 17 under Article 19 of the PCT and the further amendments made resulting in new claim 23, attached herein, the subject matter of new claim 23 (essentially corresponding to original claim 17) is not anticipated by D2 and respectfully request that this objection be withdrawn.

With respect to claims 10 and 16 (now claims 13, 14, 21 and 22), the Applicants respectfully traverse the Examiner's objection for the following reasons. D4 discloses "2-(aryl/heteroaryl)-benzimidazole" compounds and their use as "therapeutic agents in the treatment of various CNS diseases related to ER-β, for example, Alzheimer's disease." Moreover, D4 does not mention microbial infection or diseases/disorders associated with microbial infections. The Applicants assert, therefore, that the subject matter of originally filed claims 10 and 16 (now claims 13, 14, 21 and 22), which relates to anti-microbial compositions, is novel over D4 and respectfully request that this objection be withdrawn.

The Examiner further states that the documents D5 (U.S. 4,721,670), D6 (WO 98/27065 A1) and D7 (JP 11 199 582 A) disclose compounds/compositions that fall within the scope of originally filed claims 10, 16, 17 and /or 18 (now claims 13, 14, 21, 22, 23 and 24, respectively).
With regard to D5, the Applicants believe that in light of the amendments made to claims 17 and 18 under Article 19 of the PCT and the further amendments made to the claims attached herein (under Article 34 of the PCT), the subject matter of new claims 23 and 24 (essentially corresponding to original claims 17 and 18) is novel in light of the disclosure of D5 and respectfully request that this objection be withdrawn.

With respect to claims 10 and 16 (now claims 13, 14, 21 and 22), the Applicants respectfully traverse the Examiner's objection for the following reason. The compounds disclosed in D5 are "sensitive reagents" that are used for "quantitative determination of hydrogen peroxide". These compounds have not been used in the preparation of "anti-microbial compositions" as claimed in original claims 10 and 16 (now claims 13, 14, 21 and 22) of the instant application. The Applicants, therefore, assert that originally filed claims 10 and 16 (and by concordance new claims 13, 14, 21 and 22) are novel in light of the disclosure of D5 and respectfully request that this objection be withdrawn.

With regard to D6, the Applicants believe that in light of the amendments made to claims 17 and 18 under Article 19 of the PCT and the further amendments made to the claims attached herein (under Article 34 of the PCT), the subject matter of new claims 23 and 24 (essentially corresponding to original claims 17 and 18) is novel in light of the disclosure of D6 and respectfully request that this objection be withdrawn.

With respect to claims 10 and 16 (now claims 13, 14, 21 and 22), the Applicants assert that D6 discloses a specific class of "triaryl imidazole derivatives" (wherein the "imidazole ring" must have a specific substituent defined as "aryl-C(R')=C(R")COOR'") and various possible uses of the disclosed compounds. The only biological data provided in D6 (at pages 87 to 95) describes the ability of representative compounds to inhibit the activity of isolated, recombinant human

PTPases *in vitro*. The Applicants assert that D6 does not provide any data or evidence that the compounds could inhibit microbial PTPases. D6 does not, therefore, disclose the ability of these compounds to act as anti-microbial agents and merely speculates that the compounds disclosed therein can be used for the "treatment of infectious disorders caused by bacteria, viruses or other microorganisms." The Applicants, therefore, assert that, in the absence of any data to explicitly support the "anti-microbial" activity of the compounds disclosed in D6, the subject matter of originally filed claims 10 and 16, which relate to anti-microbial compositions, is novel over the cited reference. The Applicants, therefore, believe that originally filed claims 10 and 16 (and by concordance new claims 13, 14, 21 and 22) are novel in light of the disclosure of D6 and respectfully request that this objection be withdrawn.

With regard to D7, the Applicants believe that in light of the amendments to claim 17 made under Article 19 of the PCT and the further amendments made resulting in new claims 23, attached herein), the subject matter of new claim 23 is novel over the disclosure of D7. The Applicants further assert that compound/compositions disclosed in D7 are described as being useful only in the "improvement of brain circulation and central nervous function". D7 does not disclose or provide teachings for the preparation of anti-microbial compositions as claimed in originally filed claims 10 and 16. The Applicants assert, therefore, that the subject matter of originally filed claims 10, 16 and 18 (and by concordance new claims 13, 14, 21, 22 and 24) is novel over the disclosure of D7 and respectfully requests that this objection be removed.

The Examiner further states that originally filed claims 10 and 16 are anticipated by the nematocidal compositions comprising "2,3,5-triphenyl substituted imidazoles" as disclosed in document D8 (Isikdag *et al.*, 1995). The Applicants respectfully disagree and assert that the nematocidal compositions disclosed in D8, targeting against parasitic roundworms, are different to the "anti-microbial" compositions as defined in the instant application. The Applicants have further amended original claims 10 and 16 to more precisely define the subject matter of the instant invention and believe that the subject matter of new claims 13, 14, 21 and 22 (essentially corresponding to original claims 10 and 16) is novel in light of the disclosure of D8.

The Examiner also alleges that the subject matter of originally filed claims 4-7 (insofar as these claims define the use of a compound of formula (I) in the treatment of a disease or disorder associated with a microbial or fungal infection), and the subject matter of originally filed claims 10, 11 and 16, lacks novelty in light of document D10. The Applicants assert that D10 discloses "substituted imidazole compounds" as anti-inflammatory agents and their potential use to treat the inflammation associated with certain disease states, including "sepsis or septic shock". D10 demonstrates that the "substituted imidazole compounds" disclosed therein are capable of "inhibiting proinflammatory cytokines," and, therefore, D10 is directed to "substituted imidazole compounds" that have activity directly on the physiology of the organism having a specified disease or condition, and not anti-viral activity *per se*. As discussed above, claims 4, 10 and 16 were amended under Article 19 of the PCT and the Applicants believe that in light of these amendments and the further amendments to the claims attached herein, the subject matter of new claims 5, 6, 13, 14, 21 and 22 (essentially corresponding to original claims 4, 10 and 16) is novel in light of the disclosure of D10. The Applicants submit that D10 does not describe the use of any compounds to treat microbial infections or any anti-microbial compositions as recited in new claims 5, 6, 13, 14, 21 and 22. The Applicants, therefore, respectfully request that this objection be removed.

Under Subsection 3

The Examiner has objected to originally filed claims 7, 9 and 15, under Article 33(3) PCT, alleging that the subject matter of these claims is not inventive in view of document D1 and the technical problem underlying these claims has not been solved over the whole scope claimed. The Applicants believe that in light of the amendments made to claims 7, 9 and 15 under Article 19 of the PCT and the further amendments attached herein, resulting in new claims 10, 12, and 20, the subject matter of new claims 10, 12, and 20, is inventive over the disclosure of document D1 and over the whole scope claimed. The Applicants, therefore, respectfully request that this objection be withdrawn.

Under Subsection 5

The Applicants believe that in light of the amendments to the originally filed claims 17 and 18 (now claims 23 and 24) made under Article 19 of the PCT and the further amendments made to the claims attached herein (under Article 34 of the PCT), new claims 23 and 24 are consistent with one another and with the description and, therefore, meet the requirements of Article 6 PCT.

Moreover, the Applicants believe that the compound "3,3'-[5-(4-methoxyphenyl)-1H-imidazole-2,4-diyl]bis-1H-indole" (as specifically referenced by the Examiner) does not fall within the scope of new claims 23 and 24 (essentially corresponding to claims 17 and 18 as originally filed).

Under Subsection 6

With regard to the Examiner's comments relating to the requirements of Rule 5.1(a)(ii) PCT, the Applicants thank the Examiner for his comments and will address such an objection as may or may be not necessary subsequent to a filing the National Phase applications.

Under Subsection 7

With regard to the Examiner's comments relating to the industrial applicability of originally filed claims 1, 2, 4-9 and 12-15 (now claims 1-3, 5-6, 8-12 and 16-20), the Applicants believe that in light of the amendments to the originally filed claims 1, 2, 4, 6, 7, 8 and 9 (now claims 1, 2, 3, 5, 6, 9, 10, 11 and 12) made under Article 19 of the PCT and the further amendments resulting in the claims attached herein, the subject matter of these claims and the claims dependent thereon, meets the requirements of the PCT. With respect to originally filed claims 12 to 15 (now claims 16 to 20), the Applicants will address such an objection as may or may be not necessary subsequent to a filing the National Phase applications.

AMENDMENTS UNDER ARTICLE 34 PCT

The Applicant has amended the specification to correct typographical errors as follows:

On page 66, in Table 3, in the numerical identifier of the tested compounds, replace "1" with - - 2- -.

On page 67, in Table 3, in the numerical identifier of the tested compounds, replace "400" with - - 83- -.

The Applicants have taken care that no new subject matter has been added by way of the above amendments and respectfully request that the Examiner respond to the amended claims and above assertions in a favorable manner.

Respectfully submitted,

_____

Emma Macfarlane, Ph.D. (Patent Agent)
MBM & Co.
EM/aa/pt
Encl.

value provided is against all 8 strains of *S. aureus* tested except where indicated otherwise. Table 4 shows the MIC values of 3 compounds selected as examples against other gram-positive bacteria, including 2 strains resistant to the first line antibiotic vancomycin.

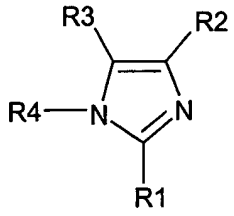
Table 3

Compound	MIC (μg/ml)
2	8-16
5	>128
7	4-16
9	8
11	8
13	2-4
15	>128
17	16[1]
19	4
21	8-16
23	4-8
25	32-64
27	32-64
29	>128
31	4
33	4-8
35	8
38	>128
40	>128
42	4
44	8
6	4
8	2
10	4

Compound	MIC (μg/ml)
20	2-4
26	2
28	2^2
32	8
34	>128
36	2
39	>128
41	>128
43	4
45	0.5
48	4-8
50	>64
51	16
52	>64
53	1
54	2-4
55	2
56	1
37	>128
46	4
49	4
83	>128
57	16
58	4
59	32
60	64
61	8
62	2
63	2

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A compound having structural formula (I):



(I)

wherein:

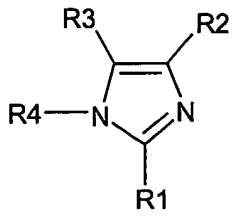
R1 is aryl, or substituted aryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano,

for use as an anti-microbial agent, wherein said compound has anti-microbial activity.

2. A compound having structural formula (I):



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

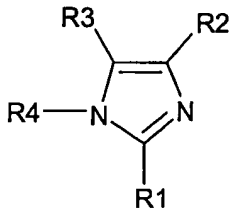
for use as an anti-microbial agent, wherein said compound has anti-microbial activity;

with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl then said compound is for use as an anti-fungal agent.

3. The compound according to claim 1 or 2, wherein said anti-microbial agent is for the treatment or prevention of a microbial infection in an animal in need thereof.

4. The compound according to claim 1 or 2, wherein said anti-microbial agent is formulated for incorporation into a cosmetic product, personal care product, cleanser, polish, paint, spray, soap, or detergent.

5. A compound having structural formula (I), or a salt thereof:



(I)

wherein:

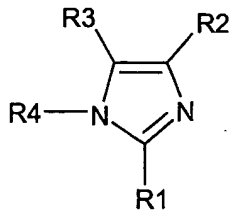
R1 is aryl, or substituted aryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

for use in the treatment or prevention of a microbial infection, ~~or a disease or disorder associated therewith,~~ wherein said microbial infection is a bacterial or fungal infection and said compound has anti-bacterial and/or anti-fungal activity.

6. A compound having structural formula (I), or a salt thereof:



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

for use in the treatment or prevention of a microbial infection, ~~or a disease or disorder associated therewith,~~ wherein said microbial infection is a bacterial or fungal infection and said compound has anti-bacterial and/or anti-fungal activity;

with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl then said microbial infection is a fungal infection.

7. (New) The compound according to claim 5 or 6, wherein said microbial infection is associated with a disease or disorder.

8 ~~7~~. The compound according to any one of claims 5, ~~or~~ 6, or 7, wherein said compound of structural formula I is used in combination with one or more anti-microbial agent(s).

9 ~~8~~. The compound according to any one of claims 5, 6 or 7, wherein said microbial infection~~, or disease or disorder associated therewith~~, is a bacterial infection~~, or disease or disorder associated therewith~~.

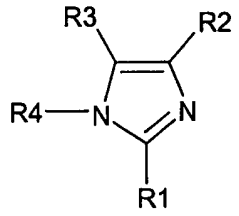
10 ~~9~~. The compound according to any one of claims 5, 6 or 7, wherein said microbial infection~~, or disease or disorder associated therewith~~, is a fungal infection~~, or disease or disorder associated therewith~~.

11 ~~10~~. The compound according to claim ~~8~~ 9, wherein said bacterial infection~~, or disease or disorder associated therewith,~~ is ~~caused by~~ a Corynebacterium xerosis, Chlamydia pneumoniae, Chlamydia trachomatis, Enterobacter cloacae, Enterobacter faecalis, Enterococcus faecium, Escherichia coli, Escherichia coli O157:H7, Haemophilus influenzae, Helicobacter pylori, Listeria monocytogenes, Moraxella catarrhalis, Neisseria gonorrhoae, Neisseria meningitidis, Pseudomonas aeruginosa, Pneumococci species, Salmonella enterica, Salmonella typhimurium, Staphylococcus aureus, Staphylococcus aureus K147, Staphylococcus epidermidis, Staphylococcus typhimurium, Streptococcus mitis, Streptococcus pneumoniae, Streptococcus pyogenes, Vibrio cholerae, Mycobacterium tuberculosis, Mycobacterium africanum, Mycobacterium avium-intracellulare, Mycobacterium pneumoniae, Mycobacterium bovis, Mycobacterium leprae, Mycobacterium. phlei or Bacillus anthracis infection.

12 ~~11~~. The compound according to claim ~~9~~ 10, wherein said fungal infection~~, or disease or disorder associated therewith,~~ is ~~caused by~~ a Histoplasma, Coccidioides, Blastomyces, Paracoccidioides, Cryptococcus, Aspergillus, Zygomycetes, Basidiobolus, Conidiobolus, Rhizopus, Mucor, Absidia, Mortierella, Cunninghamella, Saksenaea, Candida, *Cryptosporidium parvum,*

Sporothrix schenckii, Piedraia hortae, Trichosporon beigelii, Malassezia furfur, Phialophora verrucosa, Fonsecae pedrosoi, Madurella mycetomatis or *Pneumocystis carinii* infection.

13 ~~12~~. Use of ~~a~~ one or more compounds having structural formula (I), or a salt thereof, in the preparation of an anti-microbial composition:



(I)

wherein:

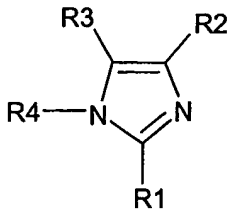
R1 is aryl, or substituted aryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said anti-microbial composition is an anti-bacterial or anti-fungal composition and said one or more compounds have anti-bacterial and/or anti-fungal activity.

14 ~~13~~. Use of ~~a~~ one or more compounds having structural formula (I), or a salt thereof, in the preparation of an anti-microbial composition:



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl and

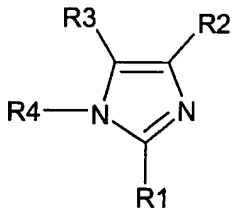
R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said anti-microbial composition is an anti-bacterial or anti-fungal composition and said one or more compounds have anti-bacterial and/or anti-fungal activity;

with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, then said anti-microbial composition is an anti-fungal composition.

15 ~~14~~. The use according to claim ~~13~~ 14, wherein said anti-microbial composition further comprises one or more anti-microbial agent(s).

16 ~~15~~. A method of inhibiting the growth and/or proliferation of a microbial cell comprising contacting said microbial cell with an effective amount of ~~a~~ one or more compounds having general formula (I), or a salt thereof:



(I)

wherein:

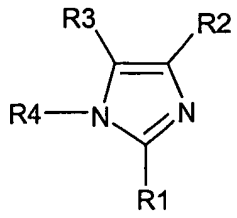
R1 is aryl, or substituted aryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano ~~;~~.

wherein said one or more compounds have anti-microbial activity.

17 ~~16~~. A method of inhibiting the growth and/or proliferation of a microbial cell comprising contacting said microbial cell with an effective amount of ~~a~~ one or more compounds having general formula (I), or a salt thereof:



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said one or more compounds have anti-microbial activity;

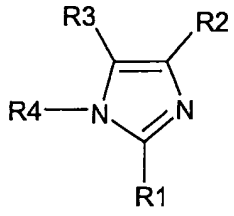
with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, then said microbial cell is a fungal cell.

18 ~~17~~. The method according to claim ~~15~~ 16 or ~~16~~ 17, further comprising contacting said cell with one or more anti-microbial agent(s).

19 ~~18~~. The method according to any one of claims ~~15, 16 or 17,~~ 16, 17 or 18, wherein said microbial cell is a bacterial cell and said one or more compounds have anti-bacterial activity.

20 ~~19~~. The method according to any one of claims ~~15, 16 or 17,~~ 16, 17 or 18, wherein said microbial cell is a fungal cell and said one or more compounds have anti-fungal activity.

21 ~~20~~. An anti-microbial composition comprising an effective amount of ~~a~~ one or more compounds having strucural formula (I), or a salt thereof, and a carrier, diluent or excipient:



(I)

wherein:

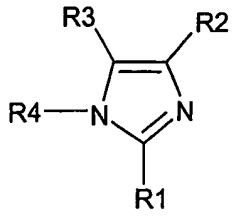
R1 is aryl, or substituted aryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said anti-microbial composition is an anti-bacterial or anti-fungal composition and said one or more compounds have anti-bacterial and/or anti-fungal activity.

22 ~~21~~. An anti-microbial composition comprising an effective amount of ~~a~~ one or more compounds having strucural formula (I), or a salt thereof, and a carrier, diluent or excipient:



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

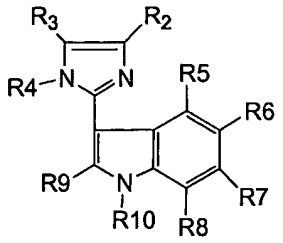
R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said anti-microbial composition is an anti-bacterial or anti-fungal composition and said one or more compounds have anti-bacterial and/or anti-fungal activity;

with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, then said anti-microbial composition is an anti-fungal composition.

23 ~~22~~. A compound having the structural formula:



II

or a salt thereof, wherein:

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl ~~[or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl];~~

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl, -CH_2-aryl, -CH_2-heteroaryl;

with the proviso that the compounds are other than:

3,3'-[5-(4-methoxyphenyl)-1H-imidazole-2,4-diyl]bis-1H-indole;

4,5-Bis(4-methoxyphenyl)-2-(3-indolyl)imidazole;

3-(4,5-diphenyl-1H-imidazol-2-yl)-1-methyl-1H-indole;

3-[4-(4-chlorophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-bromophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methylphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-ethoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4,5-bis (4-methoxydiphenyl)-1H-imidazol-2-yl)-1-methyl-1H-indole;

4,4'-[2-(2-phenyl-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;

4,4'-[2-(5-chloro-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;

2-(3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(3-indolyl)-4,5-bis[4-(diethylamino)phenyl]imidazole;

2-(2-phenyl-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(2-chloro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(2-ethylcarboxylate-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-chloro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-cyano-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-nitro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

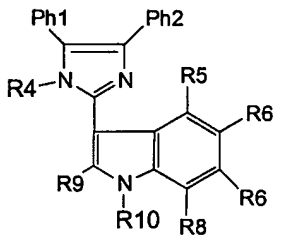
2-(5-ethylcarboxylate-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole; and

when R4 to R9 are H, and R10 is CH_3, then R2 and R3 are not both phenyl substituted at para position with –CH=CH-COOH or –CH=CH-COO-*t*-Bu~~;~~

~~and~~

~~when R4 to R10 are H, and R3 is 4-methoxyphenyl, then R2 is not 3-indolyl.~~

24 ~~23~~. A compound having the structural formula:



III

or a salt thereof, wherein:

Ph1 and Ph2 are independently selected from phenyl and substituted phenyl;

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl;

with the proviso that the compounds are other than:

4,5-Bis(4-methoxyphenyl)-2-(3-indolyl)imidazole;

3-(4,5-diphenyl-1H-imidazol-2-yl)-1-methyl-1H-indole;

3-[4-(4-chlorophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-bromophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methylphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-ethoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4,5-bis (4-methoxydiphenyl)-1H-imidazol-2-yl)-1-methyl-1H-indole;

4,4'-[2-(2-phenyl-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;

4,4'-[2-(5-chloro-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;

2-(3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(3-indolyl)-4,5-bis[4-(diethylamino)phenyl]imidazole;

2-(2-phenyl-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(2-chloro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(2-ethylcarboxylate-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-chloro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-cyano-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

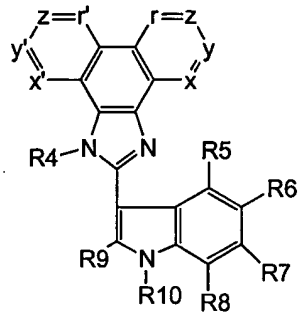
2-(5-nitro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-ethylcarboxylate-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

and

when R4 to R9 are H, and R10 is CH_3, then Ph1 and Ph2 are not both phenyl substituted at para position with –CH=CH-COOH or –CH=CH-COO-*t*-Bu.

25 ~~24~~. A compound having the structural formula:



VI

or a salt thereof, wherein:

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl;

x is CR11 or N;

y is CR12 or N;

z is CR13 or N;

r is CR14 or N;

x' is CR15 or N;

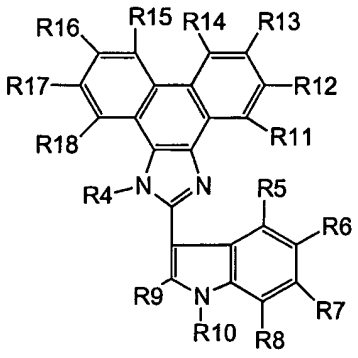
y' is CR16 or N;

z' is CR17 or N;

x' is CR18 or N;

R11, R12, R13, R14, R15, R16, R17 and R18 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, alkenyl, alkenyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

26 ~~25~~. A compound having the structural formula:



VII

or a salt thereof, wherein:

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl;

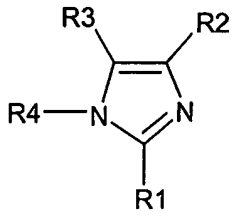
R11, R12, R13, R14, R15, R16, R17 and R18 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl,

alkenyl, alkenyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

27. (New) The compound according to any one of claims 1 to 12, wherein said compound is used in combination with one or more compounds of formula (I).

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A compound having structural formula (I):



(I)

wherein:

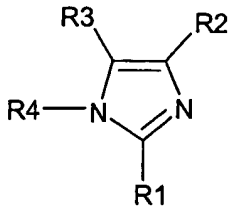
R1 is aryl, or substituted aryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano,

for use as an anti-microbial agent, wherein said compound has anti-microbial activity.

2. A compound having structural formula (I):



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

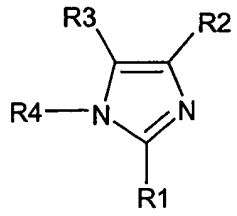
for use as an anti-microbial agent, wherein said compound has anti-microbial activity;

with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl then said compound is for use as an anti-fungal agent.

3. The compound according to claim 1 or 2, wherein said anti-microbial agent is for the treatment or prevention of a microbial infection in an animal in need thereof.

4. The compound according to claim 1 or 2, wherein said anti-microbial agent is formulated for incorporation into a cosmetic product, personal care product, cleanser, polish, paint, spray, soap, or detergent.

5. A compound having structural formula (I), or a salt thereof:



(I)

wherein:

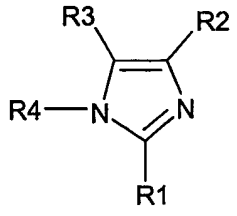
R1 is aryl, or substituted aryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

for use in the treatment or prevention of a microbial infection, wherein said microbial infection is a bacterial or fungal infection and said compound has anti-bacterial and/or anti-fungal activity.

6. A compound having structural formula (I), or a salt thereof:



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

for use in the treatment or prevention of a microbial infection, wherein said microbial infection is a bacterial or fungal infection and said compound has anti-bacterial and/or anti-fungal activity;

with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl then said microbial infection is a fungal infection.

7. The compound according to claim 5 or 6, wherein said microbial infection is associated with a disease or disorder.

8. The compound according to any one of claims 5, 6, or 7, wherein said compound of structural formula I is used in combination with one or more anti-microbial agent(s).

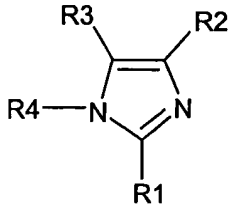
9. The compound according to any one of claims 5, 6 or 7, wherein said microbial infection is a bacterial infection.

10. The compound according to any one of claims 5, 6 or 7, wherein said microbial infection is a fungal infection.

11. The compound according to claim 9, wherein said bacterial infectionis is a Corynebacterium xerosis, Chlamydia pneumoniae, Chlamydia trachomatis, Enterobacter cloacae, Enterobacter faecalis, Enterococcus faecium, Escherichia coli, Escherichia coli O157:H7, Haemophilus influenzae, Helicobacter pylori, Listeria monocytogenes, Moraxella catarrhalis, Neisseria gonorrhoae, Neisseria meningitidis, Pseudomonas aeruginosa, Pneumococci species, Salmonella enterica, Salmonella typhimurium, Staphylococcus aureus, Staphylococcus aureus K147, Staphylococcus epidermidis, Staphylococcus typhimurium, Streptococcus mitis, Streptococcus pneumoniae, Streptococcus pyogenes, Vibrio cholerae, Mycobacterium tuberculosis, Mycobacterium africanum, Mycobacterium avium-intracellulare, Mycobacterium pneumoniae, Mycobacterium bovis, Mycobacterium leprae, Mycobacterium. phlei or Bacillus anthracis infection.

12. The compound according to claim 10, wherein said fungal infection is a Histoplasma, Coccidioides, Blastomyces, Paracoccidioides, Cryptococcus, Aspergillus, Zygomycetes, Basidiobolus, Conidiobolus, Rhizopus, Mucor, Absidia, Mortierella, Cunninghamella, Saksenaea, Candida, *Cryptosporidium parvum, Sporothrix schenckii, Piedraia hortae, Trichosporon beigelii, Malassezia furfur, Phialophora verrucosa, Fonsecae pedrosoi, Madurella mycetomatis* or *Pneumocystis carinii* infection.

13. Use of one or more compounds having structural formula (I), or a salt thereof, in the preparation of an anti-microbial composition:



(I)

wherein:

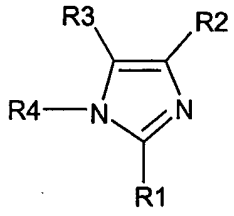
R1 is aryl,or substituted aryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said anti-microbial composition is an anti-bacterial or anti-fungal composition and said one or more compounds have anti-bacterial and/or anti-fungal activity.

14. Use of one or more compounds having structural formula (I), or a salt thereof, in the preparation of an anti-microbial composition:



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl and

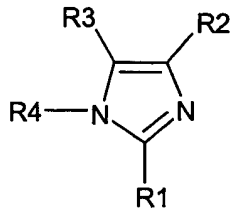
R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said anti-microbial composition is an anti-bacterial or anti-fungal composition and said one or more compounds have anti-bacterial and/or anti-fungal activity;

with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, then said anti-microbial composition is an anti-fungal composition.

15. The use according to claim 14, wherein said anti-microbial composition further comprises one or more anti-microbial agent(s).

16. A method of inhibiting the growth and/or proliferation of a microbial cell comprising contacting said microbial cell with an effective amount of one or more compounds having general formula (I), or a salt thereof:



(I)

wherein:

R1 is aryl, or substituted aryl;

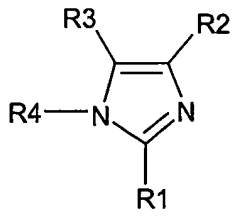
R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl,

substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said one or more compounds have anti-microbial activity.

17. A method of inhibiting the growth and/or proliferation of a microbial cell comprising contacting said microbial cell with an effective amount of one or more compounds having general formula (I), or a salt thereof:



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted

heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said one or more compounds have anti-microbial activity;

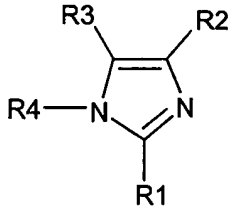
with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, then said microbial cell is a fungal cell.

18. The method according to claim 16 or 17, further comprising contacting said cell with one or more anti-microbial agent(s).

19. The method according to any one of claims 16, 17 or 18, wherein said microbial cell is a bacterial cell and said one or more compounds have anti-bacterial activity.

20. The method according to any one of claims 16, 17 or 18, wherein said microbial cell is a fungal cell and said one or more compounds have anti-fungal activity.

21. An anti-microbial composition comprising an effective amount of one or more compounds having strucural formula (I), or a salt thereof, and a carrier, diluent or excipient:



(I)

wherein:

R1 is aryl, or substituted aryl;

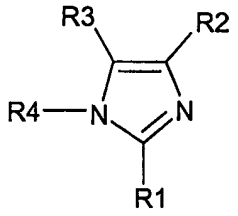
R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken

together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said anti-microbial composition is an anti-bacterial or anti-fungal composition and said one or more compounds have anti-bacterial and/or anti-fungal activity.

22. An anti-microbial composition comprising an effective amount of one or more compounds having strucural formula (I), or a salt thereof, and a carrier, diluent or excipient:



(I)

wherein:

R1 is heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

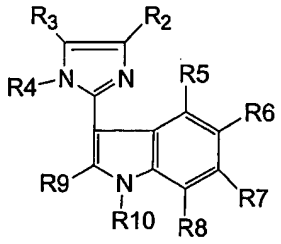
R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

wherein said anti-microbial composition is an anti-bacterial or anti-fungal composition and said one or more compounds have anti-bacterial and/or anti-fungal activity;

with the proviso that when R1 is 3-indolyl or substituted 3-indolyl, and R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl, then said anti-microbial composition is an anti-fungal composition.

23. A compound having the structural formula:



II

or a salt thereof, wherein:

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl;

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted

heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl, -CH_2-aryl, -CH_2-heteroaryl;

with the proviso that the compounds are other than:

3,3'-[5-(4-methoxyphenyl)-1H-imidazole-2,4-diyl]bis-1H-indole;

4,5-Bis(4-methoxyphenyl)-2-(3-indolyl)imidazole;

3-(4,5-diphenyl-1H-imidazol-2-yl)-1-methyl-1H-indole;

3-[4-(4-chlorophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-bromophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methylphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-ethoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4,5-bis (4-methoxydiphenyl)-1H-imidazol-2-yl)-1-methyl-1H-indole;

4,4'-[2-(2-phenyl-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;

4,4'-[2-(5-chloro-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;

2-(3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(3-indolyl)-4,5-bis[4-(diethylamino)phenyl]imidazole;

2-(2-phenyl-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(2-chloro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(2-ethylcarboxylate-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-chloro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

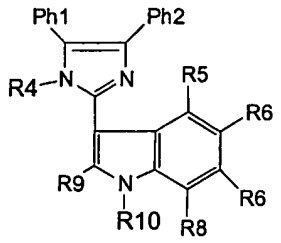
2-(5-cyano-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-nitro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-ethylcarboxylate-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole; and

when R4 to R9 are H, and R10 is CH_3, then R2 and R3 are not both phenyl substituted at para position with –CH=CH-COOH or –CH=CH-COO-*t*-Bu.

24. A compound having the structural formula:



III

or a salt thereof, wherein:

Ph1 and Ph2 are independently selected from phenyl and substituted phenyl;

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl;

with the proviso that the compounds are other than:

4,5-Bis(4-methoxyphenyl)-2-(3-indolyl)imidazole;

3-(4,5-diphenyl-1H-imidazol-2-yl)-1-methyl-1H-indole;

3-[4-(4-chlorophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-bromophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methylphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-ethoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4,5-bis (4-methoxydiphenyl)-1H-imidazol-2-yl)-1-methyl-1H-indole;

4,4'-[2-(2-phenyl-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;

4,4'-[2-(5-chloro-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;

2-(3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(3-indolyl)-4,5-bis[4-(diethylamino)phenyl]imidazole;

2-(2-phenyl-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(2-chloro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(2-ethylcarboxylate-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-chloro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

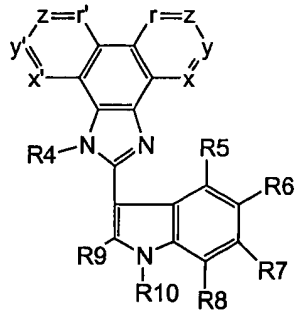
2-(5-cyano-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-nitro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;

2-(5-ethylcarboxylate-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole; and

when R4 to R9 are H, and R10 is CH_3, then Ph1 and Ph2 are not both phenyl substituted at para position with –CH=CH-COOH or –CH=CH-COO-*t*-Bu.

25. A compound having the structural formula:



VI

or a salt thereof, wherein:

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl;

x is CR11 or N;

y is CR12 or N;

z is CR13 or N;

r is CR14 or N;

x' is CR15 or N;

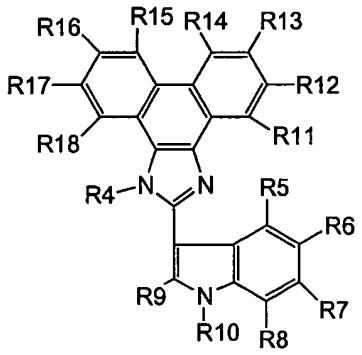
y' is CR16 or N;

z' is CR17 or N;

x' is CR18 or N;

R11, R12, R13, R14, R15, R16, R17 and R18 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, alkenyl, alkenyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

26. A compound having the structural formula:



VII

or a salt thereof, wherein:

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl,

substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl;

R11, R12, R13, R14, R15, R16, R17 and R18 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, alkenyl, alkenyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

27. The compound according to any one of claims 1 to 12, wherein said compound is used in combination with one or more compounds of formula (I).